

IN THE UNITED STATES COURT OF FEDERAL CLAIMS

LUMENCO, LLC,

Plaintiff,

v.

THE UNITED STATES,

Defendant.

Case No. 24-1052 C

Judge _____

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Lumenco, LLC (“Lumenco” or “Plaintiff”) files this Complaint against Defendant The United States (“Defendant”) alleging, based on its own knowledge as to itself and its own actions, and based on information and belief as to all other matters, as follows:

NATURE OF THE ACTION

1. This is a patent infringement action brought under 28 U.S.C. § 1498 seeking reasonable and entire compensation, as well as all other appropriate remedies, for the use and/or manufacture by or for the United States, without license, of the inventions described in and covered by the following Lumenco United States Patents (the “Asserted Patents”). This action also seeks reasonable and entire compensation for infringement by the United States based on its contractors’ use or manufacture of inventions described in and covered by the Asserted Patents where the United States has authorized and consented to such contractors’ use or manufacture for purposes of 28 U.S.C. § 1498. This action is not against such contractors for use or manufacture of the Asserted Patents for which the United States provided no authorization and/or consent.

2. True and correct copies of the Asserted Patents are attached hereto as **Exhibits A-D**:

Ex.	U.S. Patent No.	Title
A.	10,317,691 (“the ‘691 patent”)	Arrays Of Individually Oriented Micro Mirrors Providing Infinite Axis Activation Imaging For Imaging Security Devices
B.	10,189,294 (“the ‘294 patent”)	Arrays Of Individually Oriented Micro Mirrors For Use In Imaging Security Devices For Currency And Brand Authentication
C.	10,901,191 (“the ‘191 patent”)	Method Of Fabricating Arrays Of Individually Oriented Micro Mirrors For Use In Imaging Security Devices
D.	11,448,863 (“the ‘863 patent”)	Method Of Fabricating Arrays Of Individually Oriented Micro Mirrors For Use In Imaging Security Devices

PARTIES

3. Plaintiff Lumenco, LLC is a limited liability company organized under the laws of Colorado with its principal place of business located at 3600 South Huron Street, Englewood, Colorado 80110.

4. Defendant is the United States, acting through its various departments and agencies including, but not limited to, the United States Department of the Treasury (“DOT”), the Bureau of Engraving and Printing (“BEP”) and the Federal Reserve Board (“FRB”).

JURISDICTION

5. This action arises, *inter alia*, under the patent laws of the United States, Title 35 of the United States Code.

6. The United States Court of Federal Claims (“Court”) has subject matter jurisdiction over this action under 28 U.S.C. §§ 1491 and 1498.

7. Section 1491 provides, in relevant part, as follows:

The United States Court of Federal Claims shall have jurisdiction to render judgment upon any claim against the United States founded either upon the Constitution, or any Act of Congress or any regulation of an executive department, or upon any express or implied contract with the United States, or for liquidated or unliquidated damages in cases not sounding in tort. For the purpose of this paragraph, an express or implied contract with the Army and Air Force Exchange

Service, Navy Exchanges, Marine Corps Exchanges, Coast Guard Exchanges, or Exchange Councils of the National Aeronautics and Space Administration shall be considered an express or implied contract with the United States.

28 U.S.C. § 1491(a)(1).

8. Section 1498 provides, in relevant part, as follows:

Whenever an invention described in and covered by a patent of the United States is used or manufactured by or for the United States without license of the owner thereof or lawful right to use or manufacture the same, the owner's remedy shall be by action against the United States in the United States Court of Federal Claims for the recovery of his reasonable and entire compensation for such use and manufacture. Reasonable and entire compensation shall include the owner's reasonable costs, including reasonable fees for expert witnesses and attorneys, in pursuing the action if the owner is an independent inventor, a nonprofit organization, or an entity that had no more than 500 employees at any time during the 5-year period preceding the use or manufacture of the patented invention by or for the United States. Notwithstanding the preceding sentences, unless the action has been pending for more than 10 years from the time of filing to the time that the owner applies for such costs and fees, reasonable and entire compensation shall not include such costs and fees if the court finds that the position of the United States was substantially justified or that special circumstances make an award unjust.

For the purposes of this section, the use or manufacture of an invention described in and covered by a patent of the United States by a contractor, a subcontractor, or any person, firm, or corporation for the Government and with the authorization or consent of the Government, shall be construed as use or manufacture for the United States.

28 U.S.C. § 1498(a).

LUMENCO AND THE ASSERTED PATENTS

9. Lumenco is a research and development company founded in 2012 by Mark Raymond and Hector Porras. Lumenco has expertise in micro-optic, micro mirror, lighting, and screen technologies.

10. Messrs. Raymond and Porras and their company Lumenco are recognized innovators in the micro-optics technology development and commercialization space.

11. Messrs. Raymond and Porras have fifteen issued United States patents and additional pending applications.

12. Lumenco's cutting-edge micro mirror technology has a wide array of applications across diverse markets and industries including banknote security, brand protection, lighting and screen technologies, and solar technologies, among others.

13. Lumenco has enjoyed commercial success with many of its products and technologies.

14. Lumenco founded a joint banknote security venture together with KBA NotaSys in 2014. KBA NotaSys has since changed its name to Koenig and Bauer Banknote Solutions. The German Leonhard Kurz Group, which is active in the field of coatings for counterfeit prevention, among other things, is the main licensee of this joint venture.

15. In 2015, Lumenco entered into a development agreement with the Office and Technology Development division of BEP. The collaboration lasted five years and involved micro-optical technologies for use on banknotes, which allowed the United States to test in its currency one of the most advanced micro-optic arrays available.

16. Among other technologies, Lumenco recently introduced its patented refraction facet-based lighting technologies to the market.

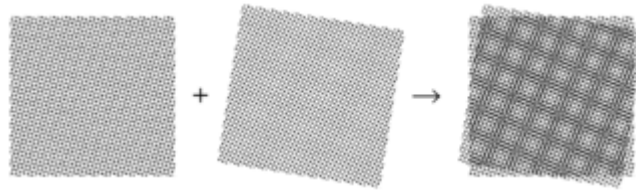
17. The Asserted Patents generally relate to anti-counterfeiting devices for authenticating currency and other brand authentication and protection uses.

18. In particular, the Asserted Patents relate to optical security features that can produce multiplanar images (i.e., the images appear to have optical depth) that are visible without the use of special glasses or aids. These security features are extremely difficult, if not impossible, to replicate and copy.

19. In the currency and brand protection space there has always been a need for technology to prevent counterfeiting. The companies involved in developing such technologies

must continually develop new technology to combat the capabilities of counterfeiters. Over the years, various processes have been used to develop security elements employed in order to protect against the counterfeiting of, *e.g.*, banknotes and elements.

20. One technology that has been used for years is moiré effects. This technology enables the creation of a periodic pattern by superimposing regular grids that are not present in any of the individual patterns. This effect can look something like the following:



The disadvantage of moiré effects is that only a small number of effects can be displayed and reverse engineering such features is also relatively easy.

21. Holograms are another technology used in the optical currency security space. Holograms can be found on Euro banknotes from the years 2013 to 2019 in the form as follows:



As an example, the hologram strip (framed in yellow in the picture above) shows, among other things, the amount of the banknote and the portrait of Europa. However, holograms are also becoming increasingly susceptible to forgery due to improvements in the technological capabilities of counterfeiters.

22. The Asserted Patents provide sophisticated and robust security features using complex pixel-mapped interlaced voxels and micro mirrors that generate multiplanar images

without specialized glasses or lighting and without the use of holographic imagery. This results in security features for banknotes and brand authentication that are practically, if not literally, impossible to replicate and that are substantially better than any prior existing technologies.

23. The Asserted Patents describe a special technique that enables images to be “written” into one or more spatial planes using a micro mirror array. The images appear above and below the plane of the security element on which the micro mirrors are located.

24. The generated images consist of several pixels. A pixel is created by several micro mirrors directing the light to a specific point. The micro mirrors that generate a pixel are referred to as a “set.”

25. A method of generating pixels by means of multiple micro mirrors is graphically illustrated in Figure 4 of the '691 patent.

26. In the example of Figure 4, the micro mirrors are located at the bottom of the security element. As shown below, the light reflected by the mirrors is represented approximately by the arrows (423). At their intersections, the reflected light creates the pixels (422) above the plane (420) of the security element. Figure 4 also shows another plane (430) on which reflected light represented by the arrows (433) generates pixels (432).

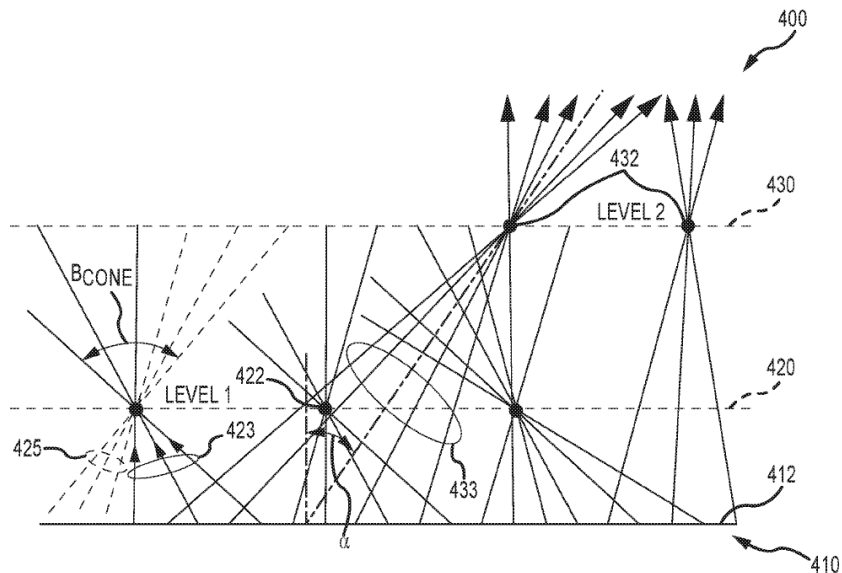


FIG.4

27. Figure 2 of the '691 patent (reproduced below) shows an example of images generated by means of these pixels from a different perspective:

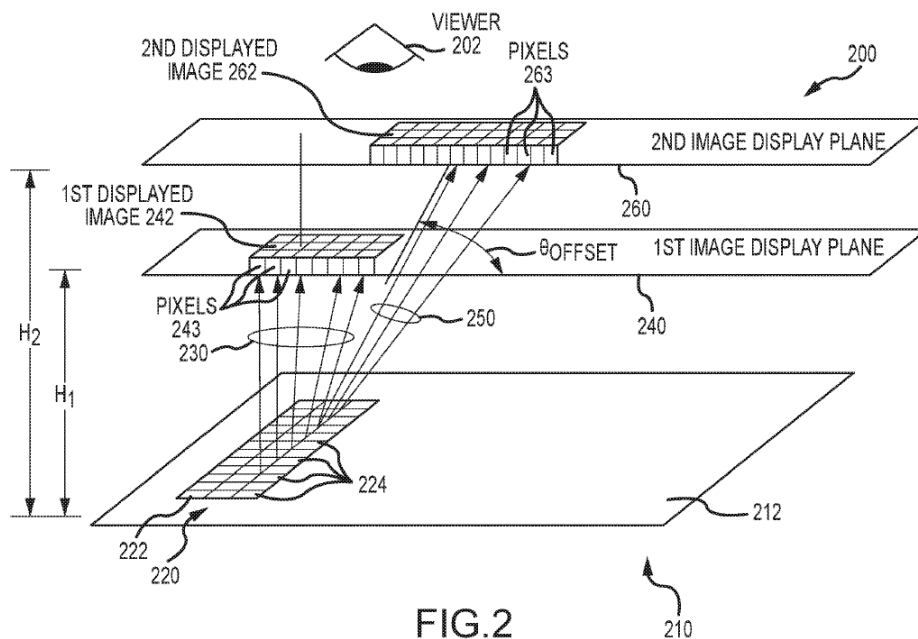


FIG.2

28. Figure 2 of the '691 patent shows an example of multiple micro mirrors (224) and two images, first displayed image 242 on plane (240) and second displayed image 262 on plane (260) above the plane of the substrate (212) on which the micro mirrors are mounted. The images

consist of several pixels (243 and 263).

LUMENCO MEETINGS WITH GIESECKE+DEVRIENT, BEP, AND FRB

29. In April 2016, Lumenco presented its Dycyfer™ technology, formerly named Fire & Ice Micro-Mirror Technology, via a proposal to the BEP's Office of Technology Development as a potential technology for use in United States banknotes. Lumenco's proposal to the BEP specifically noted that Lumenco had filed at least one patent application with the United States Patent Office related to the aforementioned technology.

30. In early 2017, Lumenco introduced its proprietary Dycyfer™ banknote security technology and its micro mirror patent portfolio to Giesecke+Devrient GmbH ("G+D"), Giesecke+Devrient Currency Technology GmbH ("G+D Currency"), and Papierfabrik Louisenthal GmbH ("PL") (collectively, "G+D").

31. Messrs. Raymond and Porras discussed Lumenco's imminent launch of the Dycyfer™ technology with G+D and were promptly invited to meet with G+D executives in Germany.

32. In May 2017, Messrs. Raymond and Porras flew to Gmund, Germany to meet with Alfred Kraxenberger, Manfred Heim, Michael Rahm, and Christian Fuhse of PL.

33. During that meeting, Messrs. Raymond and Porras presented Lumenco's Dycyfer™ technology and the patent application that eventually issued as the '294 patent.

34. Messrs. Raymond and Porras traded several emails with representatives of G+D before and after the May 2017 meeting regarding Lumenco's technology and inventions.

35. In October 2017, Messrs. Raymond and Porras presented Lumenco's technology, inventions, and patent applications at the Four Nations Conference in Mexico City. Following the conference, Messrs. Raymond and Porras shared their PowerPoint presentation, which included U.S. Patent Appl. No. 2017/0242263 that eventually issued as the '691 patent, with Mr. Marc

Surrency, Financial Services Project Leader of the FRB. *See Exhibit E* at 2, 10.

THE ACCUSED PRODUCTS

36. On information and belief, Defendant, acting through at least the DOT, the BEP, and the FRB, and its contractors (such as G+D) whose actions Defendant has authorized and consented to, has infringed and continues to infringe one or more claims of each of the Asserted Patents by making, using, testing, manufacturing, and importing certain micro mirror security threads and patches for application on currency, including, but not limited to, patches and threads displaying a plurality of images in a plane spaced a distance apart from the surface of the substrate (the “Accused Products”).

37. The Accused Products include, but are not limited to, products marketed and sold under the brand name Galaxy® as well as products sold under other brand names or proprietary code names that include micro mirror arrays that have the infringing features described in Counts I-IV below. *See, e.g., Exhibit F; Exhibit G; Exhibit H.*

38. For example, G+D is known to use different brand names for products with overlapping features, and, in some instances, is known to sell products to governments without using a standard brand name.

39. On information and belief, the Accused Products used, tested, made, manufactured, and imported by Defendant, acting through at least the DOT, the BEP, and the FRB, include features matching and/or similar to those in G+D’s Galaxy®-branded security thread as described below, which is currently used in the currency of other countries. Because the Galaxy®-branded security strips used in other countries’ currencies are publicly available, and because the Accused Products, on information and belief, include all of the relevant features of the Galaxy®-branded security strips, the claim mappings in this Complaint are based on the publicly available Galaxy®-branded security strips.

40. In *Lumenco, LLC v. Giesecke+Devrient GMBH, et. al*, C.A. No. 2:23-CV-00100 (E.D. Tex. 2023) (“the EDTX Litigation”), a now dismissed case that was previously pending in the U.S. District Court for the Eastern District of Texas, G+D argued that Lumenco’s allegations against G+D for sales of the Accused Products are barred by 28 U.S.C. § 1498 because any such sales are made to the U.S. government. See **Exhibit I**, *Lumenco, LLC v. Giesecke+Devrient GMBH, et. al*, C.A. No. 2:23-CV-00100 (E.D. Tex. 2023) at Dkt. 23, p. 12-16.

41. G+D further argued that “G+D also had ‘the authorization or consent of the Government’ to deploy (or *assist the [BEP] in deploying*) the [Accused Products], which satisfies the second element for protection under Section 1498(a).” *Id.*, Dkt. 23, p. 14 (emphasis original).

42. According to G+D, “G+D has never made, used, sold, offered for sale, shipped, imported, warehoused, or distributed any Accused Products to or within the State of Texas **for non-government entities.**” *Id.*, **Exhibit J**, Dkt. 23-1, Declaration of Dr. Manfred Heim, ¶ 8. G+D has therefore implicitly admitted that it has made, used, sold, offered for sale, shipped, imported, warehoused, or distributed Accused Products to U.S. government entities with Defendant’s authorization and consent.

43. G+D admits that it has one or more contracts with the BEP related to anti-counterfeiting manufacturing and production of U.S. Currency. *Id.*, Dkt. 60, pp. 1-2.

44. On May 7, 2024, the United States (the “Government”) filed a Statement of Interest in the EDTX Litigation. See **Exhibit K**, *Lumenco, LLC v. Giesecke+Devrient GMBH, et. al*, C.A. No. 2:23-CV-00100 (E.D. Tex. 2023) at Dkt. 101.

45. In that Statement of Interest, the Government acknowledged that “[t]he United States Bureau of Engraving and Printing (BEP) entered into two contracts with G+D2, Contract Nos. TEPD-15-1781 and 2031ZA20D00011 (the Contracts), to test and utilize security threads for

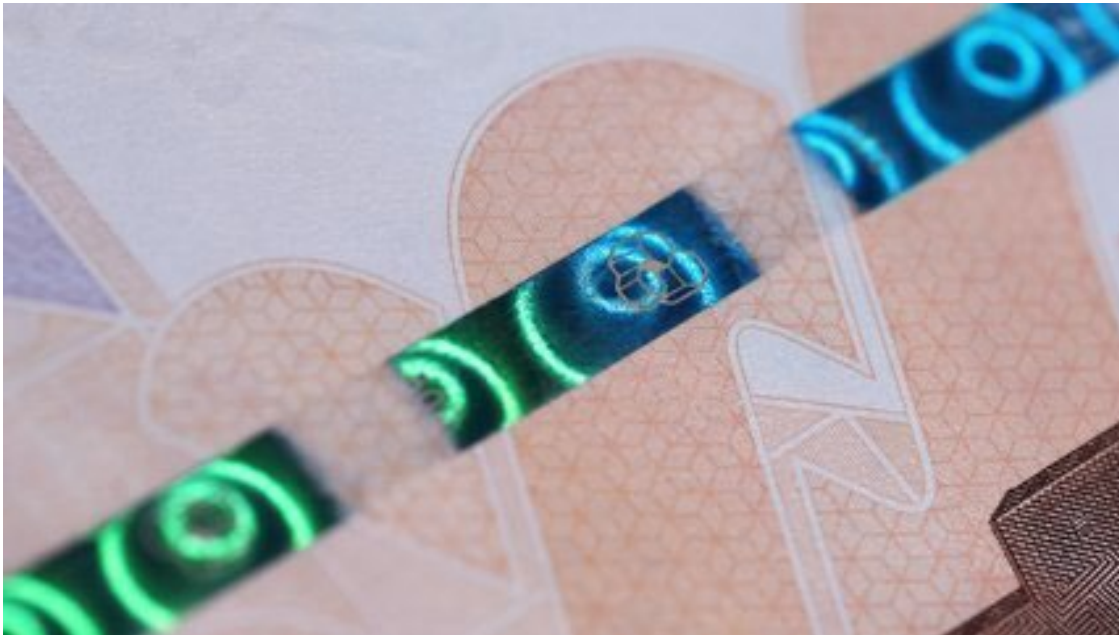
future inclusion in U.S. banknotes.” *Id.*, p.1.

46. The Government further stated that “[i]n both Contracts, BEP, on behalf of the Government, granted G+D “authorization and consent” to use inventions covered by United States patents in performing the Contracts. BEP granted authorization and consent by inserting the Federal Acquisition Regulation (FAR) clause 52.227-1, Alternate I, in the Contracts.” *Id.*

47. The Government also admitted that it, i.e., the Government, not G+D, has liability for patent infringement resulting from G+D’s performance of the Contracts pursuant to section 1498(a).

48. The Statement of Interest did not deny that the Contracts involve the Accused Products. *See generally, id.*

49. An example of a Galaxy®-branded security thread can be viewed here:



Source: Exhibit H at p. 3.

50. Versions of the Accused Products have been incorporated into various other banknotes across the world including: (1) the Honduras 200 lempiras banknote; (2) the United Arab Emirates 100-dirham banknote; (3) the Thai 1000 Baht banknote; (4) Hong Kong series

banknotes; and (5) the Guatemalan 20 quetzales banknote. Below is an example of one of these banknotes with the Galaxy®-branded security thread:



Source: Exhibit H at p. 2.



Source: Exhibit G at p. 3.

51. Defendant has entered into contracts or agreements with G+D to test the Accused

Products for potential inclusion in United States banknotes, including, but not limited to, the fifty-dollar bill. Such testing was performed by, for, or on behalf of Defendant, for example, using OptiNota and/or NotaFoil machines installed in the Fort Worth, Texas offices of the BEP, located at 9100 Blue Mound Rd, Fort Worth, TX 7613.

52. On information and belief, Defendant has also entered into contracts or agreements with G+D to include the Accused Products in certain denominations of future United States banknotes, which has resulted in the importation of Accused Products into the United States as well as use, testing, manufacturing, and sale of Accused Products within the United States.

53. On information and belief, Defendant has also entered into contracts or agreements with other third parties to include the Accused Products in certain denominations of future United States banknotes, which has resulted in the importation of Accused Products into the United States as well as use, testing, manufacturing, and sale of Accused Products within the United States.

COUNT I: INFRINGEMENT OF U.S. PATENT NO. 10,317,691

54. Lumenco repeats and re-alleges the allegations in the Paragraphs above as though fully set forth in their entirety.

55. The USPTO duly issued the '691 patent on June 11, 2019, after a full and fair examination of Application No. 15/588,831, which was filed on May 8, 2017. *See Exhibit A* at p. 1.

56. Lumenco owns all substantial rights, interest, and title in and to the '691 patent, including the sole and exclusive right to prosecute this action and enforce the '691 patent against infringers and to collect damages for all relevant times.

57. The '691 patent is valid and enforceable. The claims of the '691 patent are not directed to an abstract idea. Taken as a whole, the claimed inventions of the '691 patent are not limited to well-understood, routine, or conventional activity. Rather, the claimed inventions

include inventive components that improve on the design and fabrication of micro mirror arrays and assemblies that display imagery useful for anti-counterfeiting and/or product/document authentication.

58. The written description of the '691 patent describes in technical detail each limitation of the claims, allowing a skilled artisan to understand the scope of the claims and how the non-conventional and non-generic combination of claim limitations is patently distinct from and improved upon what may have been considered conventional or generic in the art at the time of the invention.

59. Plaintiff or its predecessors-in-interest have satisfied all statutory obligations required to collect pre-filing damages for the full period allowed by law for infringement of the '691 patent.

60. On information and belief, Defendant, through its departments and agencies, is using and/or manufacturing the inventions described in and covered by the '691 Patent.

61. On information and belief, Defendant, acting through at least the DOT, the BEP and the FRB, has infringed and continues to infringe the inventions claimed in the '691 Patent by using and/or manufacturing, without license of Lumenco or lawful right to use or manufacture, the Accused Products.

62. On information and belief, some or all of the Accused Products used and/or manufactured by Defendant are manufactured, supplied or otherwise provided by contractors, subcontractors, and/or persons, firms and/or corporations with Defendant's authorization and consent.

63. On information and belief, G+D, for the United States and with the authorization and consent of Defendant, has been, and now is, using or manufacturing, without license of

Lumenco or lawful right to use or manufacture, the inventions described in and covered by the '691 Patent.

64. On information and belief, G+D has been, and now is, by or for the United States, directly infringing the '691 Patent by making, using, offering for sale, and/or selling within the United States the Accused Products, infringing, either literally or under the doctrine of equivalents, at least claim 1 of the '691 Patent. The United States has awarded to G+D certain contracts pursuant to which G+D uses or manufactures the invention described in and covered by the '691 Patent by or for the United States without license of Lumenco or lawful right to use or manufacture the same, and with the authorization and consent of the United States for that use or manufacture, in violation of 28 U.S.C. § 1498. Lumenco is damaged by that use or manufacture and, pursuant to 28 U.S.C. § 1498, is entitled to recover reasonable and entire compensation from the United States.

65. Lumenco also seeks reasonable litigation costs, attorney and expert witness fees, taxable costs, and delay compensation for interest computed from the time payment should have been made for the license to the '691 Patent.

66. For example, on information and belief, Defendant's Accused Products include a visual display assembly useful as a security element on paper and coin currency and on product labels, comprising: a substrate; and on a surface of the substrate, an array of micro mirrors receiving ambient light and, in response, displaying a plurality of images in a plane spaced a distance apart from the surface of the substrate, wherein each of the images comprises a plurality of pixels, wherein the array of micro mirrors includes, for each of the pixels of each of the images, a set of the micro mirrors each having a reflective surface oriented to reflect the ambient light toward a point on the plane corresponding to one of the pixels, wherein each of the sets of the

micro mirrors providing the pixels for each of the differing ones of the images has a differing cone angle offset, wherein the cone angle offset is defined based upon a relative position of a cone axis for a cone of rays projected by the sets of the micro mirrors through each of the pixels, wherein the cone has a cone angle in the range of 10 to 45 degrees, wherein the cone angle offsets are selected whereby the cones do not overlap at a predefined height above the substrate, whereby only one of the images is observable at a time by a viewer, wherein each of the sets of the micro mirrors includes at least two of the micro mirrors, wherein the reflected ambient light from the at least two of the micro mirrors intersects at the point corresponding to the one of the pixels, wherein the point on the plane corresponds to an apex of a cone and the at least two of the micro mirrors are located within a base of the cone coplanar with the surface of the substrate, and wherein each of the micro mirrors in each of the sets for the micro mirrors is selected randomly from available micro mirrors in the base of the cone coplanar with the surface of the substrate, whereby each of the sets of the micro mirrors is arranged in a random pattern. Defendant's infringement in this regard is ongoing.

67. G+D has had knowledge of the '691 patent (or the applications from which it issued) since its issuance, and in any event no later than January 21, 2021. *See Exhibit L.* On information and belief, Defendant United States was expressly notified by G+D of the relevance of the '691 patent to the Accused Products by at least the time of G+D receiving the January 21, 2021 letter.

COUNT II: INFRINGEMENT OF U.S. PATENT NO. 10,317,691

68. Lumenco repeats and re-alleges the allegations in the Paragraphs above as though fully set forth in their entirety.

69. The USPTO duly issued the '294 patent on January 29, 2019, after a full and fair examination of Application No. 15/162,113, which was filed on May 23, 2016. *See Exhibit B* at

p. 1.

70. Lumenco owns all substantial rights, interest, and title in and to the '294 patent, including the sole and exclusive right to prosecute this action and enforce the '294 patent against infringers and to collect damages for all relevant times.

71. The '294 patent is valid and enforceable. The claims of the '294 patent are not directed to an abstract idea. Taken as a whole, the claimed inventions of the '294 patent are not limited to well-understood, routine, or conventional activity. Rather, the claimed inventions include inventive components that improve on the design and fabrication of micro mirror arrays and assemblies that display imagery useful for anti-counterfeiting and/or product/document authentication.

72. The written description of the '294 patent describes in technical detail each limitation of the claims, allowing a skilled artisan to understand the scope of the claims and how the non-conventional and non-generic combination of claim limitations is patently distinct from and improved upon what may have been considered conventional or generic in the art at the time of the invention.

73. Plaintiff or its predecessors-in-interest have satisfied all statutory obligations required to collect pre-filing damages for the full period allowed by law for infringement of the '294 patent.

74. On information and belief, Defendant, through its departments and agencies, is using and/or manufacturing the inventions described in and covered by the '294 patent.

75. On information and belief, Defendant, acting through at least the DOT, the BEP and the FRB, has infringed and continues to infringe the inventions claimed in the '294 patent by using and/or manufacturing, without license of Lumenco or lawful right to use or manufacture, the

Accused Products.

76. On information and belief, some or all of the Accused Products used and/or manufactured by Defendant are manufactured, supplied or otherwise provided by contractors, subcontractors, and/or persons, firms and/or corporations with Defendant's authorization and consent.

77. On information and belief, G+D, for the United States and with the authorization and consent of Defendant, has been, and now is, using or manufacturing, without license of Lumenco or lawful right to use or manufacture, the inventions described in and covered by the '294 patent.

78. On information and belief, G+D has been, and now is, by or for the United States, directly infringing the '294 patent by making, using, offering for sale, and/or selling within the United States the Accused Products, infringing, either literally or under the doctrine of equivalents, at least claim 1 of the '294 patent. The United States has awarded to G+D certain contracts pursuant to which G+D uses or manufactures the invention described in and covered by the '294 patent by or for the United States without license of Lumenco or lawful right to use or manufacture the same, and with the authorization and consent of the United States for that use or manufacture, in violation of 28 U.S.C. § 1498. Lumenco is damaged by that use or manufacture and, pursuant to 28 U.S.C. § 1498, is entitled to recover reasonable and entire compensation from the United States.

79. Lumenco also seeks reasonable litigation costs, attorney and expert witness fees, taxable costs, and delay compensation for interest computed from the time payment should have been made for the license to the '294 patent.

80. For example, on information and belief, Defendant's Accused Products include a

visual display assembly useful as a security element on paper and coin currency, and product labels, comprising: a substrate; and on a surface of the substrate, an array of micro mirrors receiving ambient light and, in response, displaying an image in a plane spaced a distance apart from the surface of the substrate, wherein the image comprises a plurality of pixels and wherein the array of micro mirrors includes for each of the pixels a different set of the micro mirrors each having a reflective surface oriented, in a fixed manner with a body of each of the micro mirrors rotated about at least one of first and second rotation axes extending through the body, to reflect the ambient light toward a point on the plane corresponding to one of the pixels, wherein each of the different sets concurrently reflect the ambient light to concurrently generate the plurality of pixels, and wherein a voxel is created at each of the points on the plane via intersection of two or more beams of the reflected ambient light and wherein each of the created voxels produces an effect of a point source of light floating above the surface of the substrate in the plane. Defendant's infringement in this regard is ongoing.

81. G+D has had knowledge of the '294 patent (or the applications from which it issued) since its issuance, and in any event no later than January 21, 2021. *See Exhibit L.* On information and belief, Defendant United States was expressly notified by G+D of the relevance of the '294 patent to the Accused Products by at least the time of G+D receiving the January 21, 2021 letter.

COUNT III: INFRINGEMENT OF U.S. PATENT NO. 10,901,191

82. Lumenco repeats and re-alleges the allegations in the Paragraphs above as though fully set forth in their entirety.

83. The USPTO duly issued the '191 patent on January 26, 2021, after a full and fair examination of Application No. 16/203,128, which was filed on November 28, 2018. *See Exhibit C* at p. 1.

84. Lumenco owns all substantial rights, interest, and title in and to the '191 patent, including the sole and exclusive right to prosecute this action and enforce the '191 patent against infringers and to collect damages for all relevant times.

85. The '191 patent is valid and enforceable. The claims of the '191 patent are not directed to an abstract idea. Taken as a whole, the claimed inventions of the '191 patent are not limited to well-understood, routine, or conventional activity. Rather, the claimed inventions include inventive components that improve on the design and fabrication of micro mirror arrays and assemblies that display imagery useful for anti-counterfeiting and/or product/document authentication.

86. The written description of the '191 patent describes in technical detail each limitation of the claims, allowing a skilled artisan to understand the scope of the claims and how the non-conventional and non-generic combination of claim limitations is patently distinct from and improved upon what may have been considered conventional or generic in the art at the time of the invention.

87. Plaintiff or its predecessors-in-interest have satisfied all statutory obligations required to collect pre-filing damages for the full period allowed by law for infringement of the '191 patent.

88. On information and belief, Defendant, through its departments and agencies, is using and/or manufacturing the inventions described in and covered by the '191 patent.

89. On information and belief, Defendant, acting through at least the DOT, the BEP and the FRB, has infringed and continues to infringe the inventions claimed in the '191 patent by using and/or manufacturing, without license of Lumenco or lawful right to use or manufacture, the Accused Products.

90. On information and belief, some or all of the Accused Products used and/or manufactured by Defendant are manufactured, supplied or otherwise provided by contractors, subcontractors, and/or persons, firms and/or corporations with Defendant's authorization and consent.

91. On information and belief, G+D, for the United States and with the authorization and consent of the Government, has been, and now is, using or manufacturing, without license of Lumenco or lawful right to use or manufacture, the inventions described in and covered by the '191 patent.

92. On information and belief, G+D has been, and now is, by or for the United States, directly infringing the '191 patent by making, using, offering for sale, and/or selling within the United States the Accused Products, infringing, either literally or under the doctrine of equivalents, at least claim 1 of the '191 patent. The United States has awarded to G+D certain contracts pursuant to which G+D uses or manufactures the invention described in and covered by the '191 patent by or for the United States without license of Lumenco or lawful right to use or manufacture the same, and with the authorization and consent of the United States for that use or manufacture, in violation of 28 U.S.C. § 1498. Lumenco is damaged by that use or manufacture and, pursuant to 28 U.S.C. § 1498, is entitled to recover reasonable and entire compensation from the United States.

93. Lumenco also seeks reasonable litigation costs, attorney and expert witness fees, taxable costs, and delay compensation for interest computed from the time payment should have been made for the license to the '191 patent.

94. For example, on information and belief, Defendant, in the making of the Accused Products, performs steps of a method of fabricating a security element useful on paper and coin

currency and product labels, comprising: providing a substrate; and forming an array of micro mirrors on a surface of the substrate, wherein the array of micro mirrors is configured for receiving ambient light and, in response, displaying an image in a plane spaced a distance apart from the surface of the substrate, wherein the image comprises a plurality of pixels, wherein the array of micro mirrors includes for each of the pixels a different set of the micro mirrors each having a reflective surface oriented, in a fixed manner, with a body of each of the micro mirrors rotated about at least one of first and second rotation axes extending through the body, to reflect the ambient light toward a point on the plane corresponding to one of the pixels, wherein each of the different sets concurrently reflect the ambient light to concurrently generate the plurality of pixels, wherein a voxel is created at each of the point on the plane via intersection of two or more beams of the reflected ambient light, and wherein each of the created voxels produces an effect of a point source of light floating above the surface of the substrate in the plane. Defendant's infringement in this regard is ongoing.

95. G+D has had knowledge of the '191 patent (or the applications from which it issued) since its issuance, and in any event no later than January 21, 2021. *See Exhibit L.* On information and belief, Defendant United States was expressly notified by G+D of the relevance of the '191 patent to the Accused Products by at least the time of G+D receiving the January 21, 2021 letter.

COUNT IV: INFRINGEMENT OF U.S. PATENT NO. 11,448,863

96. Lumenco repeats and re-alleges the allegations in the Paragraphs above as though fully set forth in their entirety.

97. The USPTO duly issued the '863 patent on September 20, 2022, after a full and fair examination of Application No. 17/152,623, which was filed on January 19, 2021. *See Exhibit D* at p. 1.

98. Lumenco owns all substantial rights, interest, and title in and to the '863 patent, including the sole and exclusive right to prosecute this action and enforce the '863 patent against infringers and to collect damages for all relevant times.

99. The '863 patent is valid and enforceable. The claims of the '863 patent are not directed to an abstract idea. Taken as a whole, the claimed inventions of the '863 patent are not limited to well-understood, routine, or conventional activity. Rather, the claimed inventions include inventive components that improve on the design and fabrication of micro mirror arrays and assemblies that display imagery useful for anti-counterfeiting and/or product/document authentication.

100. The written description of the '863 patent describes in technical detail each limitation of the claims, allowing a skilled artisan to understand the scope of the claims and how the non-conventional and non-generic combination of claim limitations is patently distinct from and improved upon what may have been considered conventional or generic in the art at the time of the invention.

101. Plaintiff or its predecessors-in-interest have satisfied all statutory obligations required to collect pre-filing damages for the full period allowed by law for infringement of the '863 patent.

102. On information and belief, Defendant, through its departments and agencies, is using and/or manufacturing the inventions described in and covered by the '863 patent.

103. On information and belief, Defendant, acting through at least the DOT, the BEP and the FRB, has infringed and continues to infringe the inventions claimed in the '863 patent by using and/or manufacturing, without license of Lumenco or lawful right to use or manufacture, the Accused Products.

104. On information and belief, some or all of the Accused Products used and/or manufactured by Defendant are manufactured, supplied or otherwise provided by contractors, subcontractors, and/or persons, firms and/or corporations with Defendant's authorization and consent.

105. On information and belief, G+D, for the United States and with the authorization and consent of the Government, has been, and now is, using or manufacturing, without license of Lumenco or lawful right to use or manufacture, the inventions described in and covered by the '863 patent.

106. On information and belief, G+D has been, and now is, by or for the United States, directly infringing the '863 patent by making, using, offering for sale, and/or selling within the United States the Accused Products, infringing, either literally or under the doctrine of equivalents, at least claim 1 of the '863 patent. The United States has awarded to G+D certain contracts pursuant to which G+D uses or manufactures the invention described in and covered by the '863 patent by or for the United States without license of Lumenco or lawful right to use or manufacture the same, and with the authorization and consent of the United States for that use or manufacture, in violation of 28 U.S.C. § 1498. Lumenco is damaged by that use or manufacture and, pursuant to 28 U.S.C. § 1498, is entitled to recover reasonable and entire compensation from the United States.

107. Lumenco also seeks reasonable litigation costs, attorney and expert witness fees, taxable costs, and delay compensation for interest computed from the time payment should have been made for the license to the '863 patent.

108. For example, on information and belief, Defendant, in the making of the Accused Products, performs the steps of a method of fabricating a security element, comprising: assigning

a first object in a starting digital image to a first image display plane and a second object in the starting digital image to a second image display plane; with a processor of a computing device, executing code to provide an array design module that operates to select a set of micro mirrors in an array of the micro mirrors to display each of the pixels of the first object in the first image display plane and to display each of the pixels of the second object in the second image display plane; for each of the pixels, determining with the array design module an angular orientation of each of the micro mirrors in the selected sets of the micro mirrors; generating a design output file including the angular orientation and location coordinates in the array for each of the micro mirrors in the selected sets of the micro mirrors; and forming the array of the micro mirrors according to the design output file. Defendant's infringement in this regard is ongoing.

109. G+D has had knowledge of the '863 patent (or the applications from which it issued) since its issuance. On information and belief, Defendant United States was notified by G+D of the relevance of the '863 patent to the Accused Products by at least as of the date it issued.

PRAYER FOR RELIEF

WHEREFORE, Lumenco respectfully requests that the Court enter judgment in favor of Lumenco and against Defendant holding that:

- a. The Asserted Patents have been used and/or manufactured by Defendant or all others acting in concert therewith, without license or lawful right within the meaning of 28 U.S.C. § 1498, such that Lumenco is entitled to the recovery of its reasonable and entire compensation for such use and manufacture;
- b. Defendant is liable to Lumenco pursuant to § 1498;
- c. Lumenco be awarded damages adequate to provide just, reasonable, and entire compensation for the Defendant's infringement of the Asserted Patents;
- d. Lumenco be awarded damages for Defendant's infringement of the Asserted Patents,

together with pre-judgment interest and costs, pursuant to 35 USC § 284, and a further award of post-judgment interest, pursuant to 28 U.S.C. § 1961, continuing until such judgment is paid;

- e. Lumenco be awarded its costs incurred in this suit, including reasonable attorneys' fees from Defendant; and
- f. Lumenco be awarded such other and further relief as this Court deems just and proper.

Dated: July 10, 2024

Respectfully submitted,

By: /s/ James F. McDonough, III

James F. McDonough, III
ATTORNEY OF RECORD

ROZIER HARDT McDONOUGH PLLC
659 Auburn Avenue NE, Unit 254
Atlanta, Georgia 30312
Telephone: (404) 564-1866
Email: jim@rhmtrial.com

OF COUNSEL:

Jonathan L. Hardt
ROZIER HARDT McDONOUGH PLLC
712 W. 14th Street, Suite A
Austin, Texas 78701
Telephone: (737) 295-0876
Email: hardt@rhmtrial.com

C. Matthew Rozier
ROZIER HARDT McDONOUGH PLLC
1500 K Street, 2nd Floor
Washington, District of Columbia 20005
Telephone: (404) 779-5305; (202) 316-1591
Email: matt@rhmtrial.com

Jonathan R. Miller
Travis E. Lynch
ROZIER HARDT McDONOUGH PLLC
659 Auburn Avenue NE, Unit 254
Atlanta, Georgia 30312
Telephone: (404) 564-1863, -1862
Email: miller@rhmtrial.com
Email: lynch@rhmtrial.com

Attorneys for Plaintiff LUMENCO, LLC

List Of Exhibits

- A. U.S. Patent No. 10,317,691
- B. U.S. Patent No. 10,189,294
- C. U.S. Patent No. 10,901,191
- D. U.S. Patent No. 11,448,863
- E. Oct. 16, 2017 Email to Marc Surrency (FRB) from Lumenco with Four Nations PowerPoint
- F. Galaxy Security Threads – 360 Authentication
- G. Louisenthal – Galaxy Security Threads
- H. Louisenthal – Case Study
- I. *Lumenco, LLC v. Giesecke+Devrient GMBH, et. al*, C.A. No. 2:23-CV-00100 (E.D. Tex. 2023) at Dkt. 23
- J. *Lumenco, LLC v. Giesecke+Devrient GMBH, et. al*, C.A. No. 2:23-CV-00100 (E.D. Tex. 2023) at Dkt. 23-1, Declaration of Dr. Manfred Heim
- K. Statement Of Interest Of The United States (*Lumenco v G+D*; E.D. Tex. No. 2:23-CV-00100)
- L. Lumenco’s January 2021 Letter to G+D